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EXAMINER	
GUZMAN, APRIL S	
ART UNIT	**PAPER NUMBER**
2618	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	02/09/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No. 10/533,279	Applicant(s) RATFORD ET AL.	
	Examiner April S. Guzman	Art Unit 2618	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *05 December 2006*.
2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.
3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-16,19 and 20* is/are pending in the application.
4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5)☐ Claim(s) _____ is/are allowed.
6)☒ Claim(s) *1-16,19 and 20* is/are rejected.
7)☐ Claim(s) _____ is/are objected to.
8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.
10)☒ The drawing(s) filed on *25 April 2005* is/are: a)☒ accepted or b)☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a)☒ All b)☐ Some * c)☐ None of:
1.☒ Certified copies of the priority documents have been received.
2.☐ Certified copies of the priority documents have been received in Application No. _____.
3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *04/28/2005*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

The Examiner acknowledges the receipt of the Applicant's amendments filed December 5, 2006. Claims 1 and 19 have been amended, Claims 17-18 have been cancelled and Claim 20 has been added. Claim 1-16 and 19-20 are therefore currently pending in the application.

Response to Arguments

Applicant's arguments filed December 5, 2006 have been fully considered but they are not persuasive.

In the present application, Applicant essentially argues that independent claim 1 has been amended to reflect that simultaneous occupancy is determined as a function of probability of a particular time slot being occupied at the same time in first and second cells, and not just a channel occupancy and that Claim 1 has been amended to distinguish from Duque-Anton et al. by reciting occupancy of time slots instead of just a radio channel.

The Examiner respectfully disagrees with Applicant's arguments because Duque-Anton et al. discloses the frequencies of the BCCHs of the adjacent base stations are announced on the SACCH of each one of the mobile stations. The timedivision multiplex frame of the GSM system is structured in such a way that it also contains time slots which are neither occupied by a traffic channel nor by a random access channel. In these time slots the receiver of the mobile station is tuned to the BCCHs of the adjacent base stations and measures their signal strengths. Therefore, in addition to evaluating the occupancy of a radio channel in adjacent stations, Duque-Anton et al. also teach the evaluation of the occupancy of a radio channel being used

between adjacent cells at the same moment or during an equivalent time slot (column 7 lines 22-38).

Consequently, in view of the above teachings of Duque-Anton et al. and having addressed Applicant's arguments, the previous rejection of claim 1 is maintained and made Final by the Examiner.

Regarding the rejection of claims 2-4 and 16 under 35 U.S.C. 103, the Applicant's arguments are not persuasive in view of the sustained rejection of claim 1 explained above. The Examiner also maintains that her obviousness rejection of claims 2-4 and 16 is proper.

Applicant's argues that claim 19 has been amended to include the same recitations as amended claim 1, in apparatus form, and is therefore deemed allowable as well for the same reasons as stated in regards to claim 1.

The Examiner respectfully disagrees with Applicant's arguments because Duque-Anton et al. discloses evaluation means 21 associated with each fixed station 20 which comprises a microcomputer 211 with associated programming. Each evaluation means 21 collects data about the actual traffic load in a cell and data about the call quality q_{ij} of one of the radio channels i at one of the fixed stations j in a dependence on the actual radio situation S, that is to say, in dependence on the fact whether that specific radio channel I, or an radio channel I' adjacent thereto in another radio cell j' is being used at that moment (column 7 lines 53-67).

Consequently, in view of the above teachings of Duque-Anton et al. and having addressed Applicant's arguments regarding independent claim 1 and claim 19, the previous rejection made to claim 19 is maintained and made Final by the Examiner.

Applicant argues that Hopkinson is solely concerned about measurement reports within the serving cell and not neighboring cells, as is recited in claim 8.

The Examiner respectfully disagrees with Applicant's arguments because Hopkinson discloses that when the adjacent channel neighbor signal level is significantly greater than the serving signal level, the probability of disruption is high, but gradually improves as the difference between signal levels decreases. For the adjacent channel case, the signal only begins to degrade once the neighbor cell is stronger than the serving cell; then as the difference increases, such as the neighbor cell gets even stronger, the probability of disruption increases (page 6 lines 7-15).

Consequently, in view of the above teachings of Hopkinson and having addressed Applicant's arguments regarding claim 8, the previous rejection made to claim 8 is maintained and made Final by the Examiner.

Regarding the rejection of claim 5-15 under 35 U.S.C. 103, the Applicant's arguments are not persuasive in view of the sustained rejection of claim 1 explained above. The examiner also maintains that her obviousness rejection of claims 5-15 is proper.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* v. *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1-4, 16, and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Sahin et al. (U.S. Patent # 6,393,277)** in view of **Duque-Anton et al. (U.S. Patent # 5,475,868)**.

Consider **claim 1**, Sahin et al. disclose a method of determining an interference relationship between cells of a cellular communication system comprising at least a first cell and a second cell (A method for identifying cells which cause interference within a cell, the disturbed cell, of a mobile cellular telecommunications network. The telecommunications network associated with telecommunications system 1 defines the service area in which wireless communication is provided wherein the service area is divided into a plurality of cells 2.)

(Abstract, Figure 1, column 4 lines 20-40, and claim 1); the method comprising the step of: determining an interference relationship between the first cell and the second cell in response to a potential interference relationship between the first and the second cell (The system includes devices for collecting data within the disturbed cell and a number of candidate cells, each of which may potentially be the case of interference within the disturbed cell. The data collection devices are adapted to measure the interference level within the disturbed cell and the level of traffic within each of the candidate cells.) (column 2 lines 35-50).

However, Sahin et al. fail to disclose the method comprising the step of determining an interference relationship between the first cell and the second cell in response to a simultaneous occupancy of the first cell and the second cell, wherein simultaneous occupancy is a measure of the probability that communication on equivalent time slots in the first and second cell will occur.

In the related art, Duque-Anton et al. disclose a detection of the states of occupancy of the radio channels at other fixed stations where there has to be an exchange between the fixed stations in the individual radio cells which exchange makes an inquiry concerning the channel occupancy possible. In the event of simultaneous occupancy of two other radio channels could thus far not be included in the planning of mobile radio systems (column 4 lines 6-32). The frequencies of the BCCHs of the adjacent base stations are announced on the SACCH of each one of the mobile stations. The timedivision multiplex frame of the GSM system is structured in such a way that it also contains time slots which are neither occupied by a traffic channel nor by a random access channel. In these time slots the receiver of the mobile station is tuned to the BCCHs of the adjacent base stations and measures their signal strengths. Therefore, in addition

to evaluating the occupancy of a radio channel in adjacent stations, Duque-Anton et al. also teach the evaluation of the occupancy of a radio channel being used between adjacent cells at the same moment or during an equivalent time slot (column 7 lines 22-38).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teachings of Duque-Anton et al. into the teachings of Sahin et al. for the purpose of minimization of the number of radio channel changes within a radio cell when a mobile radio system is optimized and optimization of an adequate call quality for a maximum number of interlocutors.

Consider **claim 2, as applied to claim 1 above**, Sahin et al. disclose a method of determining an interference relationship between cells of a cellular communication system comprising at least a first cell and a second cell (A method for identifying cells which cause interference within a cell, the disturbed cell, of a mobile cellular telecommunications network. The telecommunications network associated with telecommunications system 1 defines the service area in which wireless communication is provided wherein the service area is divided into a plurality of cells 2.) (Abstract, Figure 1, column 4 lines 20-40, and claim 1); the method comprising the step of: determining an interference relationship between the first cell and the second cell in response to a potential interference relationship between the first and the second cell (The system includes devices for collecting data within the disturbed cell and a number of candidate cells, each of which may potentially be the case of interference within the disturbed cell. The data collection devices are adapted to measure the interference level within the disturbed cell and the level of traffic within each of the candidate cells.) (column 2 lines 35-50).

However, Sahin et al. fail to disclose further comprising the steps of: dividing an evaluation interval into sub-intervals; for each sub-interval determining a sub-interval potential interference in response to the interference characteristics in each sub-interval; and determining the potential interference relationship for the evaluation interval in response to the sub-interval potential interferences.

In the related art, Duque-Anton et al. disclose a radio system is capable of autonomously adjusting itself to changes in the network in response to the parameters detected over a rather long period of time, the results collected over all the evaluation time intervals, and the current measured values. Quality data is preferably collected in pairs for an evaluation. For an evaluation the probability that a radio channel has a sufficient quality is to be computed on the assumption that the same radio channel is occupied or not at another radio station. For an evaluation of cumulative interferences it is advantageous to include the quality of a radio channel in dependence on the occupancy of the radio channels in various other radio cells. Data on radio channel quality, read as data to determine potential interference, can be collected in repetitive time intervals. There may be time intervals of equal duration depending on the traffic load of the radio cells of the order of days or weeks, but also statistically distributed time intervals (column 3 lines 18-22, column 4 lines 6-18, and column 4 lines 24-41).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teachings of Hopkinson into the teachings of Sahin et al. as modified by Duque-Anton et al. for the purpose of providing statistically distributed time intervals suitable for time-dependent optimization operation to minimize mutual influences in the radio network.

Consider **claim 3, as applied to claim 1 above**, Sahin et al. disclose a method of determining an interference relationship between cells of a cellular communication system comprising at least a first cell and a second cell (A method for identifying cells which cause interference within a cell, the disturbed cell, of a mobile cellular telecommunications network. The telecommunications network associated with telecommunications system 1 defines the service area in which wireless communication is provided wherein the service area is divided into a plurality of cells 2.) (Abstract, Figure 1, column 4 lines 20-40, and claim 1); the method comprising the step of: determining an interference relationship between the first cell and the second cell in response to a potential interference relationship between the first and the second cell (The system includes devices for collecting data within the disturbed cell and a number of candidate cells, each of which may potentially be the case of interference within the disturbed cell. The data collection devices are adapted to measure the interference level within the disturbed cell and the level of traffic within each of the candidate cells.) (column 2 lines 35-50).

However Sahin et al. fail to disclose wherein the step of determining a simultaneous occupancy comprises the steps of: dividing an evaluation interval into sub-intervals; for each sub-interval, determining a sub-interval simultaneous occupancy by determining an occupancy of each of the first cell and the second cell; and determining the simultaneous occupancy for the evaluation interval in response to the sub-interval simultaneous occupancies.

In the related art, Duque-Anton et al. disclose a radio system is capable of autonomously adjusting itself to changes in the network in response to the parameters detected over a rather long period of time, the results collected over all the evaluation time intervals, and the current measured values. Detection of the states of occupancy of the radio channels at other fixed

stations where there has to be an exchange between the fixed stations in the individual radio cells which exchange makes an inquiry concerning the channel occupancy possible. In the event of simultaneous occupancy of two other radio channels could thus far not be included in the planning of mobile radio systems. For an evaluation of so-called cumulative interferences it is advantageous to include the quality of a radio channel in dependences on the occupancy of the radio channels in various other radio cells. Such cumulative interferences, caused by the fact that a radio channel is not yet disturbed when one radio channel is occupied, but only in the event of simultaneous occupancy of two other radio channels, could thus far not be included in the planning of mobile radio systems. Data on radio channel quality and occupancy can be collected, in repetitive time intervals. There may time intervals of equal duration depending on the traffic load of the radio cells of the order of days or weeks, but also statistically distributed time intervals (column 3 lines 18-22, and column 4 lines 6-41).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teachings of Duque-Anton et al. into the teachings of Sahin et al. for the purpose of providing statistically distributed time intervals suitable for time-dependent optimization operation to minimize mutual influences in the radio network.

Consider **claim 4, as applied to claim 1 above**, Sahin et al. disclose a method of determining an interference relationship between cells of a cellular communication system comprising at least a first cell and a second cell (A method for identifying cells which cause interference within a cell, the disturbed cell, of a mobile cellular telecommunications network. The telecommunications network associated with telecommunications system 1 defines the service area in which wireless communication is provided wherein the service area is divided

into a plurality of cells 2.) (Abstract, Figure 1, column 4 lines 20-40, and claim 1); the method comprising the step of: determining an interference relationship between the first cell and the second cell in response to a potential interference relationship between the first and the second cell (The system includes devices for collecting data within the disturbed cell and a number of candidate cells, each of which may potentially be the case of interference within the disturbed cell. The data collection devices are adapted to measure the interference level within the disturbed cell and the level of traffic within each of the candidate cells.) (column 2 lines 35-50).

However, Sahin et al. fail to disclose further comprising the steps of: dividing an evaluation interval into a plurality of sub-intervals; for each sub-interval performing the steps of: determining a sub-interval simultaneous occupancy by determining an occupancy of each of the first cell and the second cell, determining a sub-interval potential interference in response to the interference characteristics in each sub-interval, and determining a sub-interval interference relationship in response to the sub-interval simultaneous occupancies and the sub-interval potential interferences; and wherein the interference relationship is determined in response to the sub-interval interference relationships.

In the related art, Duque-Anton et al. disclose a radio system is capable of autonomously adjusting itself to changes in the network in response to the parameters detected over a rather long period of time, the results collected over all the evaluation time intervals, and the current measured values. Detection of the states of occupancy of the radio channels at other fixed stations where there has to be an exchange between the fixed stations in the individual radio cells which exchange makes an inquiry concerning the channel occupancy possible. In the event of simultaneous occupancy of two other radio channels could thus far not be included in the

planning of mobile radio systems. For an evaluation of so-called cumulative interferences it is advantageous to include the quality of a radio channel in dependences on the occupancy of the radio channels in various other radio cells. Such cumulative interferences, caused by the fact that a radio channel is not yet disturbed when one radio channel is occupied, but only in the event of simultaneous occupancy of two other radio channels, could thus far not be included in the planning of mobile radio systems. Data on radio channel quality and occupancy can be collected, in repetitive time intervals. There may time intervals of equal duration depending on the traffic load of the radio cells of the order of days or weeks, but also statistically distributed time intervals. Quality data and occupancy data are preferably collected in pairs for an evaluation. For an evaluation the probability that a radio channel has a sufficient quality is to be computed on the assumption that the same radio channel is occupied or not at another radio station. For an evaluation of cumulative interferences it is advantageous to include the quality of a radio channel in dependence on the occupancy of the radio channels in various other radio cells. (column 3 lines 18-22, and column 4 lines 6-41).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teachings of Duque-Anton et al. into the teachings of Sahin et al. for the purpose of providing statistically distributed time intervals suitable for time-dependent optimization operation to minimize mutual influences in the radio network and an increase of the traffic capacity of the whole network as well as an enhancement of its operational reliability is achieved since fixed station assignment are no longer based on unreliable planning data but on tested experiences, the number of calls lost is dropped and the quality of the call is enhanced.

Consider **claim 16, as applied to claim 1 above,** Duque-Anton et al. further teaches the cellular communication system is a GSM communication system (A mobile radio system in accordance with the invention can also be integrated into already existing mobile radio systems. Such an existing mobile radio system is the Pan-European digital mobile radio system GSM.) (column 6 lines 31-35).

Consider **claim 19**, Sahin et al. disclose an apparatus for determining an interference relationship between cells of a cellular communication system comprising at least a first cell and a second cell (An apparatus in a mobile cellular telecommunications system for identifying a source of interference associated with a selected cell from one or more candidate cells.) (Abstract, and claim 8); the apparatus comprising: means for determining an interference relationship between the first cell and the second cell in response to a potential interference relationship between the first and second cell and a simultaneous occupancy of the first and the second cell (The system includes devices for collecting data within the disturbed cell and a number of candidate cells, each of which may potentially be the case of interference within the disturbed cell. The data collection devices are adapted to measure the interference level within the disturbed cell and the level of traffic within each of the candidate cells.) (column 2 lines 35-50).

However, Sahin et al. fail to disclose the apparatus comprising means for determining an interference relationship between the first cell and the second cell in response to a simultaneous occupancy of the first and the second cell, wherein simultaneous occupancy is a measure of the probability that communication on equivalent time slots in the first and second cell will occur.

In the related art, Duque-Anton et al. disclose the mobile radio system can comprise one controller, or with a distributed evaluation, also a plurality of controllers, comprising means by which the data from fixed stations are collected. In mobile radio networks one or a plurality of fixed stations comprise controllers allocated thereto which include means for determining the radio channel occupancies which include simultaneous occupancies of two radio channels (column 4 lines 24-32, column 5 lines 49-55, and column 5 lines 63-67 though column 6 line 1). Evaluation means 21 associated with each fixed station 20 which comprises a microcomputer 211 with associated programming. Each evaluation means 21 collects data about the actual traffic load in a cell and data about the call quality q_{ij} of one of the radio channels i at one of the fixed stations j in a dependence on the actual radio situation S, that is to say, in dependence on the fact whether that specific radio channel I, or an radio channel I' adjacent thereto in another radio cell j' is being used at that moment (column 7 lines 53-67).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teachings of Duque-Anton et al. into the teachings of Sahin et al. for the purpose of minimization of the number of radio channel changes within a radio cell when a mobile radio system is optimized and optimization of an adequate call quality for a maximum number of interlocutors.

Claims 5-15, and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Sahin et al. (U.S. Patent # 6,393,277)** in view of **Duque-Anton et al. (U.S. Patent # 5,475,868)** in further view of **Hopkinson (U.K. Patent Application GB 2 356 320 A)**.

Consider **claim 5, as applied to claim 3 above**, Sahin et al. as modified by Duque-Anton et al. disclose a method of determining an interference relationship between cells of a cellular communication system cell (A method for identifying cells which cause interference within a cell, the disturbed cell, of a mobile cellular telecommunications network. The telecommunications network associated with telecommunications system 1 defines the service area in which wireless communication is provided wherein the service area is divided into a plurality of cells 2.) (Sahin et al. - Abstract, Figure 1, column 4 lines 20-40, and claim 1).

However, Sahin et al. as modified by Duque-Anton et al. fail to disclose wherein the step of determining the simultaneous occupancy for the evaluation interval comprises determining the simultaneous occupancy as an average of the sub-interval simultaneous occupancies.

In the related art, Hopkinson discloses the penalty values for each cell/neighbour pair are calculated using the volume of traffic affected and the expected impact of an interfering signal to reflect the impact on the system quality of service (QOS). As shown in equation (1) and equation (2), the determination of the volume of traffic, thus the occupancy of the cell, comprises determining the sum of the probability of signal disruption of serving cell S if neighbour cell N is received at the level indicated in the measurement report over the total number of measurement reports collected for serving cell S and the probability of signal disruption of S if N is received at the level indicated in the measurement report over the total number of measurement reports collected for serving cell S, both read as the averages (page 5 lines 4-19, and page 6 lines 1-15).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teachings of Hopkinson into the teachings of Sahin et al.

as modified by Duque-Anton et al. for the purpose of providing a suitable and advantageous measure of the volume of traffic disrupted and thus the simultaneous occupancy.

Consider **claim 6, as applied to claim 3 above**, Sahin et al. as modified by Duque-Anton et al. disclose a method of determining an interference relationship between cells of a cellular communication system cell (A method for identifying cells which cause interference within a cell, the disturbed cell, of a mobile cellular telecommunications network. The telecommunications network associated with telecommunications system 1 defines the service area in which wireless communication is provided wherein the service area is divided into a plurality of cells 2.) (Sahin et al. - Abstract, Figure 1, column 4 lines 20-40, and claim 1).

However, Sahin et al. as modified by Duque-Anton et al. fail to disclose wherein the occupancy of at least one of the first cell and the second cell is determined from network statistics.

In the related art, Hopkinson discloses the penalty values for each cell/neighbour pair are calculated using the volume of traffic affected and the expected impact of an interfering signal to reflect the impact on the system quality of service (QOS). As shown in equation (1) and equation (2), the determination of the volume of traffic, thus the occupancy of the cell, comprises determining the probability of signal disruption of serving cell S if neighbour cell N is received at the level indicated in the measurement report and the probability of signal disruption of S if N is received at the level indicated in the measurement report. The penalty value or the probability of signal disruption of serving cell if neighbour cell N is received at the level indicated in the measurement report can be plotted versus the difference in received levels for the serving cell and a neighbour cell (page 5 lines 4-29, and page 6 lines 1-15).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teachings of Hopkinson into the teachings of Sahin et al. as modified by Duque-Anton et al. for the purpose of providing a probability plot which indicates that when the serving signal strength is significantly greater than the co-channel neighbour signal strength, the probability of signal disruption is low but gradually degrades as the difference between signal levels decrease and also a probability plot which indicates that when the adjacent channel neighbour signal level is significantly greater than the serving signal level, the probability of disruption is high, but gradually improves as the difference between signal levels decreases.

Consider **claim 7, as applied to claim 6 above**, Hopkinson further teaches wherein the network statistics comprise a measurement report quantity characteristic (The determination of the volume of traffic disrupted comprises the determination of the number of measurement reports collected for serving cell S and the set of all measurement reports collected from serving cell S.) (page 5 lines 4-19, and page 6 lines 1-15).

Consider **claim 8, as applied to claim 1 above,** Sahin et al. as modified by Duque-Anton et al. disclose a method of determining an interference relationship between cells of a cellular communication system cell (A method for identifying cells which cause interference within a cell, the disturbed cell, of a mobile cellular telecommunications network. The telecommunications network associated with telecommunications system 1 defines the service area in which wireless communication is provided wherein the service area is divided into a plurality of cells 2.) (Sahin et al. - Abstract, Figure 1, column 4 lines 20-40, and claim 1).

However, Sahin et al. as modified by Duque-Anton et al. fail to disclose wherein the potential interference relationship is determined in response to a measurement of a signal level in the second cell associated with a transmission in the first cell.

In the related art, Hopkinson discloses that when the adjacent channel neighbor signal level is significantly greater than the serving signal level, the probability of disruption is high, but gradually improves as the difference between signal levels decreases. For the adjacent channel case, the signal only begins to degrade once the neighbor cell is stronger than the serving cell; then as the difference increases, such as the neighbor cell gets even stronger, the probability of disruption increases (page 6 lines 7-15). Another important factor which can cause signal disruption, read as potential interference, is low signal level with respect to system noise, identified as C/N. To accurately predict network QOS, the C/N must be considered. The volume of a cell's traffic which will be disrupted due to low C/N will be independent of the frequency plan and can be calculated from the measurement report data using equation (3) (page 6 lines 22-30).

Therefore, it would have been obvious to one of ordinary skill at the time the invention was made to incorporate the teachings of Hopkinson into the teachings of Sahin et al. as modified by Duque-Anton et al. for the purpose of accurately predicting network quality of service QOS.

Consider **claim 9, as applied to claim 1 above**, Sahin et al. as modified by Duque-Anton et al. disclose a method of determining an interference relationship between cells of a cellular communication system cell (A method for identifying cells which cause interference within a cell, the disturbed cell, of a mobile cellular telecommunications network. The

telecommunications network associated with telecommunications system 1 defines the service area in which wireless communication is provided wherein the service area is divided into a plurality of cells 2.) (Sahin et al. - Abstract, Figure 1, column 4 lines 20-40, and claim 1).

However, Sahin et al. as modified by Duque-Anton et al. fail to disclose wherein the potential interference relationship is associated with assignment of co-channel carriers in the first and the second cell.

In the related art, Hopkinson discloses the use of equation (1) on page 5 line 10, which reflects the volume of traffic disrupted if channel assignments in the serving cell S and a neighbour cell N are on co-channel frequencies (page 5 lines 4-14).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teachings of Hopkinson into the teachings of Sahin et al. as modified by Duque-Anton et al. for the purpose of calculating the penalty values for each cell/neighbour pair to reflect the impact of the system quality of service.

Consider **claim 10, as applied to claim 1 above**, Sahin et al. as modified by Duque-Anton et al. disclose a method of determining an interference relationship between cells of a cellular communication system cell (A method for identifying cells which cause interference within a cell, the disturbed cell, of a mobile cellular telecommunications network. The telecommunications network associated with telecommunications system 1 defines the service area in which wireless communication is provided wherein the service area is divided into a plurality of cells 2.) (Sahin et al. - Abstract, Figure 1, column 4 lines 20-40, and claim 1).

However, Sahin et al. as modified by Duque-Anton et al. fail to disclose wherein the potential interference relationship is associated with assignment of adjacent channel carriers in the first and the second cell.

In the related art, Hopkinson discloses the use of equation (2) on page 6 line 1, which reflects the volume of traffic disrupted if channel assignments in the serving cell S and a neighbour cell N are on adjacent frequencies (page 5 lines 30-32 through page 6 line 1).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teachings of Hopkinson into the teachings of Sahin et al. as modified by Duque-Anton et al. for the purpose of calculating the penalty values for each cell/neighbour pair to reflect the impact of the system quality of service.

Consider **claim 11, as applied to claim 1 above,** Sahin et al. as modified by Duque-Anton et al. disclose a method of determining an interference relationship between cells of a cellular communication system cell (A method for identifying cells which cause interference within a cell, the disturbed cell, of a mobile cellular telecommunications network. The telecommunications network associated with telecommunications system 1 defines the service area in which wireless communication is provided wherein the service area is divided into a plurality of cells 2.) (Sahin et al. - Abstract, Figure 1, column 4 lines 20-40, and claim 1).

However, Sahin et al. as modified by Duque-Anton et al. fail to disclose wherein the potential interference relationship is in response to a ratio of communication units of the second cell for which an interference from the first cell will cause a quality level below a given threshold.

In the related art, Hopkinson discloses the predicted measure of network quality of service (QOS) for a given frequency plan, identified by QOS(FP), can be calculated from the total penalty value of that frequency plan together with the C/N penalty values from each cell using equation (4) on page 7 wherein QOS(FP) represents the proportion of total traffic which is expected to experience poor quality due to the proposed radio plan. It can be expected to be proportional to other quality measures such as drop call rate and call success rate (page 7 lines 9-20).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teachings of Hopkinson into the teachings of Sahin et al. as modified by Duque-Anton et al. for the purpose of representing a powerful measure of network QOS.

Consider **claim 12, as applied to claim 1 above**, Sahin et al. as modified by Duque-Anton et al. disclose a method of determining an interference relationship between cells of a cellular communication system cell (A method for identifying cells which cause interference within a cell, the disturbed cell, of a mobile cellular telecommunications network. The telecommunications network associated with telecommunications system 1 defines the service area in which wireless communication is provided wherein the service area is divided into a plurality of cells 2.) (Sahin et al. - Abstract, Figure 1, column 4 lines 20-40, and claim 1).

However, Sahin et al. as modified by Duque-Anton et al. fail to disclose the step of frequency planning for the cells of the cellular communication system, frequency planning including the substeps of: for the combinations of two cells determining a penalty associated with a corresponding frequency allocation in response to the interference relationship of that

combination of two cells; and allocating carrier frequencies to the plurality of cells in response to the penalty values.

In the related art, Hopkinson discloses a method for determining a quality of a frequency reuse plan in a communication system. The communication system uses frequencies within cells of the communication systems and the method includes the steps of analyzing a frequency for potential interference within a cell of the communication system and associated at least one penalty value to such frequency's potential use based on the step of analyzing. The method also includes the step determining a frequency reuse plan using the at least one penalty value, wherein the frequency reuse plan has associated therewith a quality factor related to a proportion of estimated communication system traffic which is expected to experience poor quality due to the determined frequency reuse plan (page 3 lines 9-18).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teachings of Hopkinson into the teachings of Sahin et al. as modified by Duque-Anton et al. for the purpose of implementing an intelligent optimization system to improve system quality.

Consider **claim 13, as applied to claim 12 above,** Hopkinson further teaches wherein the frequency allocation is such that the sum of penalty values is minimized (The C/I matrix values can be calculated for all cell pairs and the automatic frequency planning tool located in the OMC 215 can then select the frequency plan which minimizes the total penalty value.) (page 6 lines 16-21).

Consider **claim 14, as applied to claim 12 above**, Hopkinson further teaches wherein the penalty values are associated with corresponding frequency allocations of co-channel frequencies

(The step of analyzing a frequency further comprises the step of analyzing a frequency with regard to common and adjacent frequency interference. The step of associating at least one penalty value to such frequency's potential use based on the step of analyzing further comprises the step of associating a carrier-to-interference (C/I) penalty value related to common and adjacent frequency interference and noise interference.) (page 3 lines 19-28).

Consider **claim 15, as applied to claim 12 above,** Hopkinson further teaches wherein the penalty values are associated with the corresponding frequency allocations of adjacent channel frequencies (The step of analyzing a frequency further comprises the step of analyzing a frequency with regard to common and adjacent frequency interference. The step of associating at least one penalty value to such frequency's potential use based on the step of analyzing further comprises the step of associating a carrier-to-interference (C/I) penalty value related to common and adjacent frequency interference and noise interference.) (page 3 lines 19-28).

Consider **claim 20**, Sahin et al. disclose a method of determining an interference relationship between cells of a cellular communication system comprising at least a first cell and a second cell (A method for identifying cells which cause interference within a cell, the disturbed cell, of a mobile cellular telecommunications network. The telecommunications network associated with telecommunications system 1 defines the service area in which wireless communication is provided wherein the service area is divided into a plurality of cells 2.) (Abstract, Figure 1, column 4 lines 20-40, and claim 1); the method comprising the step of: determining an interference relationship between the first cell and the second cell in response to a potential interference relationship between the first and the second cell (The system includes devices for collecting data within the disturbed cell and a number of candidate cells, each of

which may potentially be the case of interference within the disturbed cell. The data collection devices are adapted to measure the interference level within the disturbed cell and the level of traffic within each of the candidate cells.) (column 2 lines 35-50).

However, Sahin et al. fail to disclose the method comprising the step of determining an interference relationship between the first cell and the second cell in response to a simultaneous occupancy of the first cell and the second cell, wherein simultaneous occupancy is a measure of the probability that communication on equivalent time slots in the first and second cell will occur.

In the related art, Duque-Anton et al. disclose a detection of the states of occupancy of the radio channels at other fixed stations where there has to be an exchange between the fixed stations in the individual radio cells which exchange makes an inquiry concerning the channel occupancy possible. In the event of simultaneous occupancy of two other radio channels could thus far not be included in the planning of mobile radio systems (column 4 lines 6-32). The frequencies of the BCCHs of the adjacent base stations are announced on the SACCH of each one of the mobile stations. The timedivision multiplex frame of the GSM system is structured in such a way that it also contains time slots which are neither occupied by a traffic channel nor by a random access channel. In these time slots the receiver of the mobile station is tuned to the BCCHs of the adjacent base stations and measures their signal strengths. Therefore, in addition to evaluating the occupancy of a radio channel in adjacent stations, Duque-Anton et al. also teach the evaluation of the occupancy of a radio channel being used between adjacent cells at the same moment or during an equivalent time slot (column 7 lines 22-38).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teachings of Duque-Anton et al. into the teachings of Sahin et al. for the purpose of minimization of the number of radio channel changes within a radio cell when a mobile radio system is optimized and optimization of an adequate call quality for a maximum number of interlocutors.

Sahin et al. as modified by Duque-Anton et al. teach a method of determining an interference relationship between cells of a cellular communication system comprising at least a first cell and a second cell; the method comprising determining an interference relationship between the first and the second cell, and a simultaneous occupancy of the first and second cell, wherein simultaneous occupancy is a measure of the probability that communication on equivalent time slots in the first and second cell will occur.

However, Sahin et al. as modified by Duque-Anton et al. fail to teach a measurement of a signal level in the second cell associated with a transmission in the first cell.

In the related art, Hopkinson teaches that when the adjacent channel neighbor signal level is significantly greater than the serving signal level, the probability of disruption is high, but gradually improves as the difference between signal levels decreases. For the adjacent channel case, the signal only begins to degrade once the neighbor cell is stronger than the serving cell; then as the difference increases, such as the neighbor cell gets even stronger, the probability of disruption increases (page 6 lines 7-15). Another important factor which can cause signal disruption, read as potential interference, is low signal level with respect to system noise, identified as C/N. To accurately predict network QOS, the C/N must be considered. The volume of a cell's traffic which will be disrupted due to low C/N will be independent of the

frequency plan and can be calculated from the measurement report data using equation (3) (page 6 lines 22-30).

Therefore, it would have been obvious to one of ordinary skill at the time the invention was made to incorporate the teachings of Hopkinson into the teachings of Sahin et al. as modified by Duque-Anton et al. for the purpose of accurately predicting network quality of service QOS.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any response to this Office Action should be **faxed to** (571) 273-8300 **or mailed to**:

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Hand-delivered responses should be brought to

Customer Service Window
Randolph Building
401 Dulany Street
Alexandria, VA 22314

Any inquiry concerning this communication or earlier communications from the examiner should be directed to April S. Guzman whose telephone number is 571-270-1101. The examiner can normally be reached on Monday - Thursday, 8:00 a.m. - 5:00 p.m., EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edan Orgad can be reached on 571-272-7884. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

April S. Guzman
A.S.G/asg

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PRIMARY PATENT EXAMINER
2/5/07